

2/4 B.Tech. FOURTH SEMESTER

CE4T2

GEO TECHNICAL ENGINEERING – I

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Pre-requisites: Engineering geology, fluid mechanics

Learning objectives:

- To study the soil structure, consistency limits and IS Classification of soils.
- To conduct laboratory tests on soils.
- To know the permeability, flow nets, seepage, Boussinesq and Westergaard's analysis.
- To understand the compaction, Liquefaction, Consolidation and shear strength of soils.

Course outcomes:

At the end of course the student will be able to

1. Understand formation of soil properties and basic definition
2. Determine and classify the soil for engineering and index properties of soil & coefficient of permeability
3. Knowledge of principle of effective stress and point load different shapes
4. Determine compaction characteristics of soil and consolidation
5. Determine shear strength and compressibility of soil application.

UNIT – 1

Introduction

Soil formation and soil types; Regional soil deposits of India

Basic Definitions And Relations

Phase diagrams; Simple definitions; some important relationships; Index Properties; Grain size distribution; Atterberg Limits; Significance of other Soil Aggregate properties

UNIT – II

Soil Classification

Clay Mineralogy: Introduction to soil classification; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system

Permeability

Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability constant and Variable head methods, indirect methods, Factors affecting permeability; Permeability of stratified soil deposits. ;

UNIT – III

Seepage through Soils

Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition

Stress Distribution in Soil

Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart.

UNIT – IV

Compaction of Soils

Introduction; Laboratory tests; Factors affecting compaction; Structure and engineering behavior of Compacted cohesive soils; Compaction in the field; Compaction specifications and field control.

Compressibility of Soil And Consolidation

Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of Settlement; extrapolation of field consolidation curve; Settlement analysis.

UNIT – V

Shear Strength Of Soils

Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage conditions and Strength parameters.

Learning Resources

TEXT BOOKS :

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers
2. Soil Mechanics and Foundation Engg (7th edition) by Dr. Arora, K.R., Standard Publisher and Distributors, Delhi, 2010.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications

REFERENCES :

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Co.
2. A Text book of Soil Mechanics and Foundation Engineering – P.Purushothama Raj, Pearson Education
3. Introduction to Soil Mechanics- Braja M Das

e-learning resources:

<http://nptel.ac.in/courses.php>

<http://jntuk-coeerd.in/>